REMARKS

I. Introduction

At the time of the Office Action dated July 24, 2006, claims 2-10, 12-31, and 34-38 are pending in this application. In this Amendment, claims 34-38 have been amended, claims 2-10 and 12-31 have been canceled, and new claims 39-69 have been added. Care has been exercised to avoid the introduction of new matter. New claims 39-69 are prepared based on original claims 1-30, which are supported in, for example, Figs. 1 and 4 and relevant description of the specification. Entry of the present Amendment is respectfully solicited. A Request for Continuing Examination is filed herewith.

Now, claims 34-69 are active in this application, of which claims 39, 49, 66, and 67 are independent.

II. The Rejection of Claims 37 and 38 under U.S.C. §112, First Paragraph

The Examiner asserted that the claims contain subject matter which is not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In response, claims 37 and 38 have been amended based on Fig. 1 and the First Embodiment of the specification. Withdrawal of the rejection of claims 37 and 38 is, therefore, respectfully solicited.

III. The Rejection of Claims 2-10, 12-31 and 34-38

The rejection of claims 2-10 and 12-31 under 35 U.S.C. §103(a) has been rendered moot by cancellation of these claims. The rejection of claims 34-38 under 35 U.S.C. §103(a) has also been rendered moot by amending these claims to be dependent on new claims 39 and 49,

respectively. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims under 35 U.S.C. §103(a).

IV. New Claims

Independent claims 39 and 49 are directed to a solid state imaging apparatus, while claims 66 and 67 are directed to a camera comprising a solid state imaging apparatus of claims 39 and 49, respectively. One aspect of the present invention is that a floating diffusion section (FD section), a transistor (pixel amplifier) and a line (output signal line) are shared by a plurality of photoelectric (photodiode: PD) sections. Accordingly, it is possible to reduce the number of locations of the floating diffusion sections per one photoelectric cell (i.e. pixel), and therefore to increase the aperture ratio of the photoelectric section to the photoelectric cell. As a result, it is possible to reduce the size of the photoelectric cell while increasing the aperture area of the photoelectric section to the photoelectric cell.

Comparison between the Present Invention and References

i) Guidash (USP 6,352,869; "Guidash '869")

Guidash '869 discloses in Fig. 3b, a solid state imaging apparatus comprising: a pixel architecture 30 having photodetectors 71, 73, 72 and 74 arranged in arrays; transfer gates 51, 61, 52 and 62 transferring charges from the respective photodetectors; a first FD section 41 connected to the photodetectors 72 and 74 via the transfer gates 52 and 62, a second DF section 42 connected to the photodetectors 71 and 73 via the transfer gates 51 and 61; and an amplifier 32 connected to the first and second FD sections. It is apparent from Fig. 3b, the amplifier 32 is shared by two FD sections 41 and 42, and the two FD sections are included in one pixel architecture 30 (see Fig. 3b and column 3, lines 55-59).

Accordingly, the FD sections of Guidash '869 are not connected to different amplifiers, respectively. This is different from the present invention in claim 39, where a first pixel amplifier for detecting charges of a first PD section and a second pixel amplifier for detecting charges of a second FD section are provided separately. Guidash '869 does not disclose, at a minimum, "a plurality of first pixel amplifier transistors each detecting and outputting the potential of each first floating diffusion section; and a plurality of second pixel amplifier transistors each detecting and outputting the potential of each second floating diffusion section," recited in claim 39.

In addition, each of the FD sections of Guidash '869 is not provided between the pixel architectures and not shared by the photodetectors included in adjacent rows and in the same column. This structure is different from the structure of the present invention according to claim 49, in which each of the FD sections is provided between the photoelectric conversion cells and shared by the photoelectric conversion sections included in adjacent rows and in the same column. That is, Guidash '869 does not disclose, at a minimum, a plurality of floating diffusion sections each being provided between the photoelectric conversion cells, each floating diffusion section being shared by, and being connected to, the photoelectric conversion sections which are respectively included in the at least two rows and the at least one column in each photoelectric conversion cell via transfer transistor, respectively, recited in claim 49.

ii) Hashimoto (USP 6,956,605)

Hashimoto discloses in its Figs. 2 and 21, a solid state imaging apparatus comprising: unit cells 81 having photoelectric conversion sections 82a to 82d arranged in arrays; transfer gates 83a to 83d transferring charges from the respective photoelectric conversion sections; an FD section 85 connected to the respective photoelectric conversion sections via the transfer

gates; an amplifier 86 connected to the FD section; and read-out interconnections 88a to 88d connected to the respective transfer gates.

It is apparent from Figs. 2 and 21 of Hashimoto, the photoelectric conversion sections, which are included in different rows in the respective unit cells, are not connected to FD sections different from (or independent of) each other. This is different from the present invention in claim 39, where the photoelectric conversion sections included in a first row are connected to first floating diffusion sections and that the photoelectric sections included in a second row are connected to second floating diffusion sections. Thus, Hashimoto does not disclose, at a minimum, "a plurality of first floating diffusion sections each being shared by, and being connected to, the photoelectric sections which are included in the first row of each photoelectric conversion cell via a plurality of transfer transistors, respectively," and "a plurality of second floating diffusion sections each being shared by, and being connected to the photoelectric sections which are included in the second row of each photoelectric conversion cell via a plurality of transfer transistors, respectively," recited in claim 39.

In addition, each of the FD sections of Hashimoto is not provided between the unit cells and not shared by the photoelectric conversion sections included in adjacent rows and in the same column. This structure is different from the structure of the present invention according to claim 49, in which each of the FD sections is provided between the photoelectric conversion cells and shared by the photoelectric conversion sections included in adjacent rows and in the same column. That is, Hashimoto does not disclose, at a minimum, a plurality of floating diffusion sections each being provided between the photoelectric conversion cells, each floating diffusion section being shared by, and being connected to, the photoelectric conversion sections

which are respectively included in the at least two rows and the at least one column in each photoelectric conversion cell via transfer transistor, respectively, recited in claim 49.

iii) Guidash et al. (USP 6,552,323; "Guidash '323")

Guidash '323 discloses that an FD section and an amplifier are shared between two pixels adjacent to each other. The problem is that this structure makes it difficult to perform an electronic shutter. Guidash '323 aims to solve this problem and discloses a structure of sharing a pixel output node and an output signal line between at least two rows adjacent pixels (see column 2 lines 55-57).

Accordingly, as shown in Fig. 2a, Guidash '323 provides one FD section for one pixel. This structure is the same as that of the conventional art in the present specification and thus, different from what is claimed in claims 39 and 49.

iv) Patterson (USP 6,541,794)

Patterson relates to an imaging capturing circuits to be used in copiers, scanners, digital cameras, and other devices. Patterson does not cure the deficiencies of Guidash '869, Hashimoto, and Guidash '323.

v) Yamazaki et al. (US patent application publication No. 2002/0145582)

Yamazaki et al. are directed to a display device which includes a pixel section and a driving circuit for transmitting a signal to the pixel section, both of which are provided on the same insulator. Yamazaki et al. do not cure the deficiencies of Guidash '869, Hashimoto, and Guidash '323.

Accordingly, Applicants submit that independent claims 39 and 49 are patentably distinguishable over Guidash '869, Hashimoto, Guidash '323, Patterson, and Yamazaki et al. The above discussion is applicable to independent claims 66 and 67. It is also noted that

dependent claims 40-48, 50-65, 67, and 68, as well as claims 34-38, are patentably distinguishable over Guidash '869, Hashimoto, Guidash '323, Patterson, and Yamazaki et al., at least because these claims include all the limitations recited in independent claims 39 and 49, respectively.

Applicants, therefore, respectfully solicit favorable consideration of claims 34-69.

V. Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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